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EXAMINER	
PROCTOR, JASON SCOTT	
ART UNIT	PAPER NUMBER
2123	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/721,544	KONDO, KOICHI	
	Examiner	Art Unit	
	JASON PROCTOR	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 August 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-4,6-10,12-16 and 18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,6-10,12-16 and 18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1-4, 6-10, 12-16, and 18 were rejected in the Office Action entered on 27 March 2008.

Applicants' response submitted on 27 August 2008 has amended claims 1, 6, 7, 12, 13, and 18. Claims 1-4, 6-10, 12-16, and 18 are pending in this application.

Claims 1-4, 6-10, 12-16, and 18 are rejected.

Response to Remarks – Objections to the Specification

1. In response to the previous objection to the specification for containing an embedded hyperlink and/or other form of browser-executable code, Applicants submit that the present amendment overcomes this objection.

The Examiner submits that the amendment does not overcome the grounds for objection. Applicants' specification refers to an internet address without any date and without providing any factual evidence for what may be found at that internet address. The Examiner respectfully suggests that Applicants print out the subject matter to which the specification refers, cite that print out (with a date) on an Information Disclosure Statement, and amend the specification to refer to the print out.

Response to Remarks - 35 USC § 101

2. The previous rejection of claims 7-10 and 12 under 35 U.S.C. § 101 is withdrawn in response to the amendments to the claims.

Response to Remarks – 35 USC § 102

3. In response to the previous rejection of claims 1-4, 6-10, 12-16, and 18 under 35 U.S.C. § 102 as being anticipated by Liu, Applicants argue primarily that:

> Applicants respectfully submit that the Liu et al. reference fails to disclose the steps of generating a plurality of internal data expressions of all the continuous system equations, based on extracted second description data of the continuous system model, and generating a table representing a relationship between the internal data expressions of the continuous system equations including the simultaneous equations and switching conditions thereof, based on the extracted first description data of the state transition model, as recited in amended claim 1. The Liu et al. reference is silent regarding generating the plurality of internal data expressions and generating the table representing a relationship between the internal data expressions of the continuous system equations and switching conditions thereof, as recited in Claim 1.

The Examiner respectfully traverses this argument as follows.

Liu discloses generating the plurality of internal data expressions of the continuous system equations including the simulation equations [*"We refer to (q, x) ∈ Q × X as they (hybrid) state of H..."* (page 3508, § 1)]. Note that Q and X represent the *discrete* and *continuous* variables, respectively, and thus the *hybrid state* of the *open hybrid automaton H* is an internal expression of the continuous system. The continuous subsystem is shown elsewhere to be simultaneous ordinary differential equations (e.g., page 3509, § 2.2).

Further, Liu discloses generating a table representing a relationship between the internal data expressions of the continuous system equations and switching conditions therefore [*"h: Q × X × U → Y is an output map"* and *"E ⊂ Q × Q is a collection of discrete transitions*" (page 3508, § 1)]. Liu describes this arrangement in common language [*"Intuitively, an execution of a hybrid automaton starts from an initial state, runs the continuous dynamic for a while* [i.e., runs a simulation using a continuous subsystem of simultaneous ordinary differential equations], *makes a discrete state transition* [i.e., identifies that switching conditions of the continuous

subsystem have been detected and transitions to a different state], *and then runs (another) continuous dynamic for another period of time, and so on."* (page 3508, § 1).

This description corresponds to the formal notation shown immediately above on page 3508, defining an *execution* χ of a hybrid automaton H, where the execution is clearly based upon "the internal data expressions" (continuous evolution) and the switching conditions (discrete evolution).

Applicants further argue that:

> While the Liu et al. reference discloses a breakpoint table for handling predictable breakpoints, this table is based on a schedule of known breakpoints, not on the state transition model. In contrast, Claim 1 requires selecting an active continuous system equation by using the generated table according to an occurrence of an event.

The Examiner respectfully traverses this argument as follows.

As shown above, Liu clearly discloses selecting an active continuous system equation (i.e., selecting a state and its corresponding continuous ordinary differential equations) based upon an event, which Liu describes as "making a discrete state transition".

Applicants' arguments have been fully considered but have been found unpersuasive.

Specification

4. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

The hyperlink appears at page 2, lines 12-13.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-4, 6-10, 12-16, and 18 rejected under 35 U.S.C. 102(b) as being anticipated by "A Hierarchical Hybrid System Model and Its Simulation" by Liu et al. (Liu).

Regarding claim 1, Liu discloses:

A simulation method for simulating a behavior of a mechanism of a mechanical device that using a hybrid model of the mechanical device, the mechanical device being regulated by mechanism control software, the hybrid model including a state transition model and a continuous system model [*"The modeling of hierarchical hybrid systems is achieved by combining continuous-time models with finite state automata... A hybrid helicopter control system is simulated as an example."* (abstract)], the method comprising:

Inputting hybrid model description data representing the hybrid model [*"A 2-D model of a helicopter is extracted from [8]."* (page 3511, § 6.1)];

Analyzing the hybrid model description data to extract first description data of the state transition model and second description data of the continuous system model, which is represented as simultaneous equations of ordinary differential equations and algebraic equations [*"An* execution *of a hybrid automaton is defined [12] as a collection ... (initial condition); (continuous evolution); (discrete evolution); (output evaluation). Intuitively, an execution of a*

hybrid automaton starts from an initial state, runs the continuous dynamic for a while, makes a discrete state transition, and then runs (another) continuous dynamic for another period of time, and so on." (page 3508, § 1, notation omitted); *"In each discrete state* q *of a hybrid automaton, there is an "open" continuous subsystem with the form of a set of ordinary differential equations (ODEs)"* (page 3509, § 2.2)];

Generating a plurality of internal data expressions of all the continuous system equations, based on the extracted second description data [*"We refer to (q, x) ∈ Q × X as they (hybrid) state of H..."* (page 3508, § 1); *"In each discrete state* q *of a hybrid automaton, there is an "open" continuous subsystem with the form of a set of ordinary differential equations (ODEs)"* (page 3509, § 2.2)];

Generating a table representing a relationship between the internal data expressions of the continuous system equations including the simultaneous equations and switching conditions thereof, based on the extracted first description data [*"Predictable breakpoints are stored chronologically in a* breakpoint table*"* (page 3510, § 3.2); *"If* φ *in (8) is only a function of time (the event of this type is called a* time event*) then we know the exact state transition time before the simulation actually reaches that time. In this case, the state transition time is simply registered as a predictable breakpoint. Since the breakpoint table mechanism can guarantee that the simulation will not miss any predictable breakpoint during the execution, the invariant monitor can emit the triggered event at the desired time."* (page 3511, § 4.1)];

Starting a simulation of the mechanism after completion of generating the table and generating the internal data expressions [*"When simulating a hybrid system in Ptolemy II, the*

interaction of discrete and continuous dynamics goes through the following steps:…" (page 3511, § 5)];

Selecting an active continuous system equation by looking up the table according to an occurrence of an event [*"1.) During continuous evolution, the system is simulated as a CT system where the hybrid automaton is replaced by the continuous dynamics of its current state."* (page 3511, §5)]; and

Outputting data that represents the behavior of the mechanism by solving the selected active continuous system equation by numerical integration using the internal data expressions that correspond to the selected active continuous system equations, wherein the outputted data is supplied to the mechanism control software as a response to a control signal provided from the mechanism control software [outputting data – *"The simulation runs as a Java applet, and the result is shown in Figure 6."* (page 3513, § 6.5); solving continuous system equations by numerical integration – *"The task of a simulator is to solve the set of ODEs numerically…"* (page 3509, § 3); *"Other integration methods, like linear multistep (LMS) methods and Runge-Kutta (RK) methods, are similarly accomplished."* (page 3510, § 3); supplied to mechanism control software [*"The hybrid system is modeled in Ptolemy II as Figure 5… In each flight mode, there is a concrete controller that computes the control output given the state of the helicopter. "* (page 3512, § 6.5)].

Regarding claim 2, Liu discloses switching the active one of the continuous system equations to another continuous system equation by operating a flag assured for each of the continuous system equations [*"Predictable breakpoints are stored chronologically in a*

breakpoint table" (page 3510, § 3.2); *"If φ in (8) is only a function of time (the event of this type is called a* time event*) then we know the exact state transition time before the simulation actually reaches that time. In this case, the state transition time is simply registered as a predictable breakpoint. Since the breakpoint table mechanism can guarantee that the simulation will not miss any predictable breakpoint during the execution, the invariant monitor can emit the triggered event at the desired time."* (page 3511, § 4.1)].

Regarding claim 3, Liu discloses wherein the event is response to one of the signal and an evaluation result of an internal variable [*"Predictable breakpoints are stored chronologically in a* breakpoint table" (page 3510, § 3.2); *"If φ in (8) is only a function of time (the event of this type is called a* time event*) then we know the exact state transition time before the simulation actually reaches that time. In this case, the state transition time is simply registered as a predictable breakpoint. Since the breakpoint table mechanism can guarantee that the simulation will not miss any predictable breakpoint during the execution, the invariant monitor can emit the triggered event at the desired time."* (page 3511, § 4.1)].

Regarding claim 4, Liu discloses executing a kinematics simulation which uses the data that represents the behavior of the system [*"A hybrid helicopter control system is simulated as an example."* (abstract)].

Claim 6 recites generating program code corresponding to the method steps of claim 1. Liu discloses this code [*"Ptolemy II"* (abstract)] and discloses the method steps of claim 1.

Claims 7-10 recite an "apparatus" consisting of units corresponding to the methods of claims 1-4. Liu discloses those methods and discloses a software "apparatus" for performing those steps [*"Ptolemy II"* (abstract)].

Claim 12 recites an "apparatus" comprising units similar to claim 7 and performs a method similar to claim 1, all of which is disclosed by Liu and shown above.

Claims 13-16 recite a "computer program stored in a computer readable medium" consisting of means for performing the methods of claims 1-4. Liu discloses that method and a computer program for doing so as shown above.

Claim 18 recites a "computer program stored in a computer readable medium" that performs the method steps of claim 1. Liu discloses this program as shown above.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason Proctor whose telephone number is (571) 272-3713. The examiner can normally be reached on 8:30 am-4:30 pm M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached at (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR)

system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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